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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Katsushige Amano

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WENDEROTH, LIND & PONACK, L.L.P.

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EXAMINER

TANG, KENNETH

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/750,852	Applicant(s) AMANO ET AL.	
	Examiner KENNETH TANG	Art Unit 2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,7 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,7 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 January 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the Amendment filed on 1/7/08.
2. The indicated allowability of claims 4 and 10 is withdrawn in view of the newly discovered reference(s) to Anderson (US 5,465,335). Rejections based on the newly cited reference(s) follow.
3. Claims 1, 7, and 15 are presented for examination.

Drawings

4. The drawings were received on 1/7/08. These drawings are accepted by the Examiner.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1, 7, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kling et al. (hereinafter Kling) (US 6,662,203 B1) in view of Takeuchi et al. (hereinafter Takeuchi) (US 5,944,778), and further in view of Anderson (US 5,465,335).**

6. As to claim 1, Kling teaches a computing device comprising a processor, and a process scheduling apparatus for performing parallel processing of a plurality of processes respectively having assigned priorities (see Abstract), said process scheduling apparatus comprising:

at least one delayed task processing unit (processing core 40 or multiple processing units 45A-D) (Fig. 1, 40, col. 3, lines 23-42) for executing delayed tasks (signals/processes that are in delay queue) (see Abstract) in among the plurality of processes, the at least one delayed task processing unit having a queuing table in which the delayed tasks are to be registered (delay queue is built using one or several queue segments, having a table of pointers to segments) (col. 9, lines 1-7), and having an assigned priority that is variable, wherein the delayed tasks include a task involved in an interrupt handler task for which processing can be delayed (different priority levels) (see Abstract, col. 3, lines 28-42, col. 9, lines 22-34, col. 5, lines 61-67 through col. 6, lines 1-8);

a plurality of normal process executing units (multiple processing units 45A-D, Fig. 1, col. 3, lines 24-34) for respectively executing one of the plurality of processes other than the delayed tasks, and having an assigned priority identical to the priority of the executed process (col. 9, lines 31-35, col. 2, lines 35-48);

a process scheduling unit (job scheduler 30, Fig. 1, col. 3, lines 23-42) for sequentially activating the at least one delayed task processing unit (processing core 40) and the normal process executing units (multiple processing units 45A-D, Fig. 1, col. 3, lines 24-34) according to the priorities assigned to the at least one delayed task processing unit and the normal process executing units to make the at least one delayed task processing unit and the normal process executing units execute corresponding processes (highest priority level is scheduled first before the lower priority level jobs) (col. 5, lines 1-18, col. 2, lines 34-48);

Art Unit: 2193

a delayed task registration processor (any one of multiple processing units 45A-D, etc., Fig. 1, col. 3, lines 24-34) for registering a newly generated delayed task (signals/processes that are in delay queue) (see Abstract) and a priority thereof in the queuing table (delay queue is built using one or several queue segments, having a table of pointers to segments) (col. 9, lines 1-7) of the at least one delayed task processing unit (processing core 40);

a delayed task priority controller (priority analysis unit 36) for selecting the delayed task (signal/process in the delay queue 20) of highest priority from the delayed tasks registered in the queuing table (delay queue 20) (col. 5, lines 39-60, col. 8, lines 38-41)); and

7. Kling is silent in teaching a process priority controller for setting the priority of the delayed task processing unit identical to the priority of the delayed task selected by the delayed task priority controller. However, Takeuchi teaches task scheduling and execution of “normal” processes and idle or delay processes with a means for setting the execution priority (“raised” or “depressed”) of an idle/delayed process (col. 7, lines 15-23) and that setting the priority of a delayed task processing unit (signal handler) to its subject process is typical (col. 2, lines 40-51). Takeuchi also teaches registering the processes beforehand (col. 1, lines 32-38). Kling and Takeuchi are analogous art because they are in the same field of endeavor of task/processing scheduling. They both support normal and delay processes, registration of processes, as well as scheduling based on priority, among other things. One of ordinary skill in the art would have known to modify Kling’s task scheduling system to include the feature of setting the priority of the delayed task processing unit identical to the priority of the delayed task selected by the delayed task controller of Takeuchi’s task scheduling system. The suggestion/motivation for

doing so would have been to reduce overhead required to control processes and to prevent further processing delays (col. 2, lines 54-65).

8. Kling and Takeuchi are silent in teaching wherein when the newly generated delayed task is generated, the process priority controller sets the priority of the at least one delayed task processing unit before an initiation of a next process following a currently executed process by suspending the currently executed process, setting the priority of the delayed task processing unit, and then resuming the currently executed process.

9. Takeuchi teaches a process scheduling apparatus wherein when the new delayed task is generated, the process priority controller sets the priority of the delayed task processing unit before an initiation of a next process following a currently executed process at the generation of the new delayed task (col. 6, lines 57-60). This makes sense because when delaying a task, the priority must change to a lower one to delay execution from occurring. There are only two periods of time when this priority could be established before execution of the next process. The priority would have to be established either after the current process has completed execution or during its execution. If the latter, implementation would have required that execution of the current process be suspended.

10. Anderson teaches any tasks can be suspended from current execution and then resumed (col. 2, lines 1-27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kling and Takeuchi's delayed task processing system such that it included the features of Anderson's suspension and resuming of tasks so that priority can be set. The suggestion/motivation for doing so would have been to provide synchronization between the

processes (col. 2, lines 1-27). Therefore it would have been obvious to combine the references of Kling, Takeuchi, and Anderson to obtain the invention of claim 1.

11. As to claim 7, Kling teaches a process scheduling method for performing parallel processing of a plurality of processes respectively having assigned priorities, comprising:

sequentially executing a delayed task handling process for processing delayed tasks (signals/processes that are in delay queue) (see Abstract) and normal processes for executing processes other than the delayed tasks according to priorities respectively assigned to the delayed task handling process and the normal processes, wherein the delayed tasks include a task involved in an interrupt handler task for which processing can be delayed (col. 1, lines 63-65, col. 9, lines 22-34, col. 5, lines 61-67 through col. 6, lines 1-8, col. 25, lines 27-40 and col. 22, lines 1-24);

registering a newly generated delayed task (signals/processes are registered by being placed into the delay queue) with the priority assigned thereto in a queuing table (delay queue) (see Abstract, col. 9, lines 1-7 and 31-35, col. 2, lines 35-48);

12. Kling is silent in teaching selecting a delayed task of highest priority from the delayed tasks registered in the queuing table; and setting the priority of the delayed task handling process identical to the priority of the selected delayed task.

13. However, Takeuchi teaches task scheduling and execution of “normal” processes and idle or delay processes with a means for setting the execution priority of an idle/delayed process (col.

Art Unit: 2193

7, lines 15-23) and that setting the priority of a delayed task processing unit (signal handler) to its subject process is typical (col. 2, lines 40-51). Specifically, the process having the priority set to “raised” is assured to have the highest priority (col. 6, lines 55-65). Takeuchi also teaches registering the processes beforehand (col. 1, lines 32-38). Kling and Takeuchi are analogous art because they are in the same field of endeavor of task/processing scheduling. They both support normal and delay processes, registration of processes, as well as scheduling based on priority, among other things. One of ordinary skill in the art would have known to modify Kling’s task scheduling system to include the feature of setting the priority of the delayed task processing unit identical to the priority of the delayed task selected by the delayed task controller of Takeuchi’s task scheduling system. The suggestion/motivation for doing so would have been to reduce overhead required to control processes and to prevent further processing delays (col. 2, lines 54-65).

14. Takeuchi wherein when the newly generated delayed task is generated the priority of the delayed task handling process is set before an initiation of a next process following a currently executed process (col. 6, lines 57-60).

15. Kling and Takeuchi are silent wherein said setting the priority of the delayed task handling process comprises: suspending the currently executed process and resuming the currently executed process.

16. Takeuchi teaches a process scheduling apparatus wherein when the new delayed task is generated, the process priority controller sets the priority of the delayed task processing unit before an initiation of a next process following a currently executed process at the generation of

Art Unit: 2193

the new delayed task (col. 6, lines 57-60). This makes sense because when delaying a task, the priority must change to a lower one to delay execution from occurring. There are only two periods of time when this priority could be established before execution of the next process. The priority would have to be established either after the current process has completed execution or during its execution. If the latter, implementation would have required that execution of the current process be suspended.

17. Anderson teaches any tasks can be suspended from current execution and then resumed (col. 2, lines 1-27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kling and Takeuchi's delayed task processing system such that it included the features of Anderson's suspension and resuming of tasks so that priority can be set. The suggestion/motivation for doing so would have been to provide synchronization between the processes (col. 2, lines 1-27). Therefore it would have been obvious to combine the references of Kling, Takeuchi, and Anderson to obtain the invention of claim 7.

18. As to claim 15, it is rejected for the same reasons as stated in the rejection of claim 1. In addition, Takeuchi discloses the program being stored on a computer readable storage medium such as a hard disk or a CD-ROM (col. 25, lines 65-67).

Response to Arguments

19. Applicant argues as detailed in the Office Action, claims 1-6 have been rejected under 35 U.S.C. § 101 as being directed towards non-statutory subject matter. Claim 1 has been amended to include patentable subject matter by reciting a "computing device comprising a processor,

Art Unit: 2193

wherein the computing device is operable as a scheduling apparatus for performing parallel processing of a plurality of processes respectively having assigned priorities..." Support for this amendment can be found in the substitute specification in paragraphs 0016-0018. Accordingly, the Applicants respectfully request that the 35 U.S.C. § 101 rejection of claim 1 be withdrawn.

Applicant's amendment has overcome the rejections under 35 U.S.C. 101 and the Examiner has withdrawn these rejections.

20. Applicant states that the specification and abstract have been carefully reviewed and revised to make grammatical and idiomatic improvements in order to aid the Examiner in further consideration of the application. A substitute specification and abstract including the revisions have been prepared and are submitted herewith. No new matter has been added. Also submitted herewith are marked-up copies of the substitute specification and abstract indicating the changes incorporated therein.

The title of the invention has been amended to include the correct spelling of "APPARATUS." The Abstract has been objected to by the Examiner. Specifically, the Examiner asserted that the last sentence is incomplete and needs to end with a period. The Abstract has been amended to address the Examiner's concern. Accordingly, the Applicants respectfully request that the objection to the Abstract be withdrawn.

In response, the Examiner has withdrawn the objections to the Abstract/Specification.

21. Applicant states that the drawings have been objected to by the Examiner. Specifically, the Examiner asserted that the drawings contain spelling errors, and noted that in Figures 4, 7 and 8 "DELAYTED TASK HANDLING PROCESS EXECUTION" should be amended to "DELAYED TASK HANDLING PROCESS EXECUTION." Figures 4, 7 and 8 have been amended as suggested by the Examiner. New replacement formal drawings for Figures 4, 7 and 8 have been prepared and are submitted herewith, and include the changes detailed above.

In response, the Examiner has withdrawn the objections to the Drawings. The Drawings are now approved by the Examiner.

22. Applicant states that claims 1-3, 5-9 and 11-14 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kling et al. (U.S. Patent No. 6,662,203) (hereinafter referred to as "Kling") in view of Takeuchi et al. (U.S. Patent No. 5,944,778) (hereinafter referred to as "Takeuchi"). Claim 1 has been amended to include the subject matter of previously pending claims 2-4. Moreover, claim 7 has been amended to include the subject matter of previously pending claims 8-10. Furthermore, new claim 15 has been drafted to recite a computer program recorded on a computer-readable storage medium and to include the subject matter of original claim 1 and previously pending claims 2-4. Consequently, claims 1, 7 and 15 each contain

Art Unit: 2193

subject matter indicated as allowable in the Office Action. Thus, the Applicants respectfully submit that the 35 U.S.C. §103(a) rejections are moot. Accordingly, for at least the reasons set forth above, the Applicants respectfully request that the 35 U.S.C. § 103(a) rejections be withdrawn. In view of the foregoing amendments and remarks, all of the claims in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

In response, the indicated allowability of claims 4 and 10 is withdrawn in view of the newly discovered reference(s) to Anderson (US 5,465,335). New rejections based on the newly cited reference(s) were made above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH TANG whose telephone number is (571)272-3772.

The examiner can normally be reached on 8:30AM - 6:00PM, Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kenneth Tang/
Examiner, Art Unit 2195

/Lewis A. Bullock, Jr./
Supervisory Patent Examiner, Art Unit 2193